UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/784,472	02/24/2004	David Brady	280/102	1758

30310 7590 02/16/2012

DigitalOptics Corporation East
c/o Lee & Morse, P.C.
3141 FAIRVIEW PARK DRIVE, SUITE 500
FALLS CHURCH, VA 22042

EXAMINER	
KHAN, USMAN A	

ART UNIT	PAPER NUMBER
2622	

NOTIFICATION DATE	DELIVERY MODE
02/16/2012	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

eoa@lee-iplaw.com
smorse@lee-iplaw.com
swerbow@lee-iplaw.com

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/784,472
Filing Date: February 24, 2004
Appellant(s): BRADY ET AL.

Susan S. Morse (Reg. No. 35,292)
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 11/22/2011 appealing from the Office action mailed 02/22/2011.

(1) Real Party in Interest

The examiner has no comment on the statement, or lack of statement, identifying by name the real party in interest in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The following is a list of claims that are rejected and pending in the application:

Claims 1 – 40 are rejected.

(4) Status of Amendments After Final

The examiner has no comment on the appellant's statement of the status of amendments after final rejection contained in the brief.

(5) Summary of Claimed Subject Matter

The examiner has no comment on the summary of claimed subject matter contained in the brief.

(6) Grounds of Rejection to be Reviewed on Appeal

The examiner has no comment on the appellant's statement of the grounds of rejection to be reviewed on appeal. Every ground of rejection set forth in the Office action from which the appeal is taken (as modified by any advisory actions) is being maintained by the examiner except for the grounds of rejection (if any) listed under the

subheading "WITHDRAWN REJECTIONS." New grounds of rejection (if any) are provided under the subheading "NEW GROUNDS OF REJECTION."

(7) Claims Appendix

The examiner has no comment on the copy of the appealed claims contained in the Appendix to the appellant's brief.

(8) Evidence Relied Upon

7009652	Tanida et al.	03-2006
5355222	Heller et al.	10-1994
7003177	Mendlovic et al.	02-2006
6366319	Bills	04-2002
6137535	Meyers	10-2000

Applicant admitted prior art

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 30, 31, 33, and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanida et al. (US patent No. 7,009,652) in view of Heller et al. (US patent No. 5,355,222).

Regarding **claim 30**, Tanida et al. teaches an imaging system (column 2 lines 46 – 58), comprising: an array of lenses (figure 1 item 1 microlens array with plurality of microlenses 1a; also column 3 lines 52 – column 4 line 9); a plurality of detectors for each lens (figure 1 item 3 photosensitive element array with plurality of photosensitive elements 3a; also column 3 lines 52 – column 4 line 9), the detectors being on an image plane of the imaging system (figure 1 item 3); and a corresponding plurality of multiple image blocking portions provided for each detector (figure 8 item 4 polarizing filter array with plurality of polarizing filters 4a; also column 6 lines 25 – 60), a pattern of multiple image blocking portions being substantially the same for the plurality of detectors associated with a corresponding lens (figure 8 item 4 polarizing filter array with plurality of polarizing filters 4a; also column 6 lines 25 – 60), the plurality of multiple image blocking portions being between the lens and the plurality of detectors (figure 8 item 4 polarizing filter array with plurality of polarizing filters 4a; also column 6 lines 25 – 60), wherein at least two patterns of multiple image blocking portions associated with different lenses are different (figure 8 item 4 polarizing filter array with plurality of polarizing filters 4a; also column 6 lines 25 – 60), an output of the plurality of detectors foe each lens together representing an input image multiplied by a selected transform matrix (column 6 line 18 – 24; inverse matrix method and column 3 lines 63 *et seq.* processing unit U).

However, Tanida et al. fails to teach that each image blocking portion being smaller than a detector. Heller et al., on the other hand teaches that each image blocking portion being smaller than a detector.

More specifically, Heller et al. teaches that each image blocking portion being smaller than a detector (figures 2, 4, 7, 7A and 8).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Heller et al. with the teachings of Tanida et al. because in column 2 lines 29 - 35 Heller et al. teaches that the invention compensates for the effect of perspective viewing hence improving the image quality.

Regarding **claim 31,** as mentioned above in the discussion of claim 29 Tanida et al. in view of Heller et al. teach all of the limitations of the parent claim.

However, Tanida et al. fails to teach that wherein one lens of the array of lenses has no multiple image blocking portions associated therewith. Heller et al., on the other hand teaches that wherein one lens of the array of lenses has no multiple image blocking portions associated therewith.

More specifically, Heller et al. teaches that the wherein one lens of the array of lenses has no multiple image blocking portions associated therewith (Figures 2, 4 and 8 item A(0)).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Heller et al. with the

teachings of Tanida et al. because in column 2 lines 9 *et seq.* Heller et al. teaches that this method will increase sensitivity of the system.

Regarding **claim 33**, as mentioned above in the discussion of claim 30, Tanida et al. in view of Heller et al. teaches all of the limitations of the parent claim.

However, Tanida et al. fails to teach that each image blocking portion is smaller than a detector in both directions. Heller et al., on the other hand teaches that each image blocking portion is smaller than a detector in both directions.

More specifically, Heller et al. teaches that each image blocking portion is smaller than a detector in both directions (figures 2, 4, 7, 7A and 8).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Heller et al. with the teachings of Tanida et al. because in column 2 lines 29 - 35 Heller et al. teaches that the invention compensates for the effect of perspective viewing hence improving the image quality.

Regarding **claim 34**, as mentioned above in the discussion of claim 33, Tanida et al. in view of Heller et al. teaches all of the limitations of the parent claim. Additionally, Heller et al. teaches that each image blocking portion in a pattern has equal dimensions in both directions (figures 2, 4, 7, 7A and 8).

Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tanida et al. (US patent No. 7,009,652) in view of Heller et al. (US patent No. 5,355,222) and in further view of Official Notice.

Regarding claim **32**, as mentioned above in the discussion of claim 30, Tanida et al. in view of Heller et al. teach all of the limitations of the parent claim.

However, Tanida et al. in view of Heller et al. fail to teach that the selected transform matrix is a Hadamard matrix.

The examiner takes Official Notice that it is old and well known in the art to use Hadamard matrix when capturing an image.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a Hadamard matrix to correct for errors and the very same matrix which is used for deriving the transformed components of the input video signal can be used for reconverting such transformed components back into the original video signal.

Claims 1 – 4, 6, 9 - 13, 15 – 19, 21 – 29, 36 – 37, and 39 - 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanida et al. (US patent No. 7,009,652) in view of Mendlovic et al. (US patent No. 7,003,177) and in further view of Heller et al. (US patent No. 5,355,222).

Regarding **claim 1**, Tanida et al. teaches an imaging system (column 2 lines 46 – 58), comprising: an array of lenses (figure 1 item 1 microlens array with plurality of microlenses 1a; also column 3 lines 52 – column 4 line 9); a plurality of detectors for

each lens (figure 1 item 3 photosensitive element array with plurality of photosensitive elements 3a; also column 3 lines 52 – column 4 line 9), the detectors being on an image plane of the imaging system (figure 1 item 3 photosensitive element array with plurality of photosensitive elements 3a; also column 3 lines 52 – column 4 line 9); and a corresponding plurality of focal plane coding elements (figure 8 item 4 polarizing filter array with plurality of polarizing filters 4a; also column 6 lines 25 – 60), a focal plane coding element provided for each detector each focal plane coding element having multiple pixel resolution elements (figure 8 item 4 polarizing filter array with plurality of polarizing filters 4a; also column 6 lines 25 – 60, a pattern of the multiple pixels resolution elements being substantially the same for the plurality of detectors associated with a corresponding lens (figure 8 item 4 polarizing filter array with plurality of polarizing filters 4a; also column 6 lines 25 – 60), the plurality of focal plane coding elements being between the lens and plurality of detectors (figure 8 item 4 polarizing filter array with plurality of polarizing filters 4a; also column 6 lines 25 – 60), wherein at least two of the focal plane coding elements provided for the plurality of detectors associated with different lenses have different patterns of multiple pixel resolution elements (figure 8 item 4 polarizing filter array with plurality of polarizing filters 4a; also column 6 lines 25 – 60 each of the adjacent items of 4a are polarized in a different direction);

an output of the plurality of detectors for each lens together representing an input image multiplied by a selected transform matrix (column 6 line 18 – 24; inverse matrix method and column 3 lines 63 *et seq.* processing unit U).

However, Tanida et al. fails to teach that the pixels are sub-pixels. Mendlovic et al., on the other hand teaches that the pixels are sub-pixels.

More specifically, Mendlovic et al. teaches that that the pixels are sub-pixels (column 2 line 38 – 45, column 6 liens 47 *et seq.*, column 13 lines 3 *et seq.*, and column 14 lines 8 *et seq.*; sub-pixel).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Mendlovic et al. with the teachings of Tanida et al. because in column 2 line 27 – column 3 line26 Mendlovic et al. teaches that using the CCD configuration of the invention will improve the image quality.

However, Tanida et al. in view of Mendlovic et al. fail to teach that each image blocking portion being smaller than a detector. Heller et al., on the other hand teaches each image blocking portion being smaller than a detector.

More specifically, Heller et al. teaches that each image blocking portion being smaller than a detector (figures 2, 4, 7, 7A and 8).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Heller et al. with the teachings of Tanida et al. in view of Mendlovic et al. because in column 2 lines 29 - 35 Heller et al. teaches that the invention compensates for the effect of perspective viewing hence improving the image quality.

Regarding **claim 2**, as mentioned above in the discussion of claim 1, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches that the focal plane-coding element provides pixel shifted multiple images on each sensor pixel (figure 5 and column 6 lines 5 – 17).

However, Tanida et al. in view of Heller et al. fails to teach that the pixels are sub-pixels. Mendlovic et al., on the other hand teaches that the pixels are sub-pixels.

More specifically, Mendlovic et al. teaches that that the pixels are sub-pixels (column 2 line 38 – 45, column 6 liens 47 *et seq.*, column 13 lines 3 *et seq.*, and column 14 lines 8 *et seq.*; sub-pixel).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Mendlovic et al. with the teachings of Tanida et al. and in further view of Heller et al. because in column 2 line 27 – column 3 line26 Mendlovic et al. teaches that using the CCD configuration of the invention will improve the image quality.

Regarding **claim 3**, as mentioned above in the discussion of claim 1, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches that the focal plane-coding element is an apertured mask (figure 1, item 2 partition wall layer with partition layers 2a).

Regarding **claim 4**, as mentioned above in the discussion of claim 1, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches that the imaging system further comprising color filters (column 11 lines 24 – 38).

Regarding **claim 6**, as mentioned above in the discussion of claim 1, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches a birefringent structure adjacent the focal plane-coding element (figure 2).

Regarding **claim 9**, as mentioned above in the discussion of claim 1, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches at least one sensor pixel receives light from more than one lens of the array of lenses (figure 11, 12A, and 12B).

Regarding **claim 10**, as mentioned above in the discussion of claim 1, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches a processor receiving the outputs of the sensor pixels and multiplying the outputs by an inverse of the selected transform matrix (column 6 line 18 – 24; inverse matrix method and column 3 lines 63 *et seq.* processing unit U).

Regarding **claim 11**, as mentioned above in the discussion of claim 10, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches that the processor reconstructs an image from the outputs, a number of image pixels in the image being greater than the plurality of sensor pixels (column 2 lines 46 – 58).

Regarding **claim 12**, Tanida et al. teaches an imaging system (column 2 lines 46 – 58), comprising: an array of lenses (figure 1 item 1 microlens array with plurality of microlenses 1a; also column 3 lines 52 – column 4 line 9); a plurality of detectors for each lens (figure 1 item 3 photosensitive element array with plurality of photosensitive elements 3a; also column 3 lines 52 – column 4 line 9); a corresponding plurality of detectors (figure 8 item 4 polarizing filter array with plurality of polarizing filters 4a; also column 6 lines 25 – 60), a filter provided for each detector (figure 8 item 4 polarizing filter array with plurality of polarizing filters 4a; also column 6 lines 25 – 60), each filter having multiple pixel resolution elements (figure 8 item 4 polarizing filter array with plurality of polarizing filters 4a; also column 6 lines 25 – 60), a pattern of the multiple pixels resolution elements being substantially the same for the plurality of detectors associated with a corresponding lens (figure 8 item 4 polarizing filter array with plurality of polarizing filters 4a; also column 6 lines 25 – 60), and providing a pixel shifted multiple image on each sensor pixel (figure 8 item 4 polarizing filter array with plurality of polarizing filters 4a; also column 6 lines 25 – 60); the filter being between the lens

and the plurality of detectors (figure 8 item 4 being between the lens and the detectors); and a processor receiving outputs from each detector and reconstructing an image (column 6 line 18 – 24; inverse matrix method and column 3 lines 63 *et seq.* processing unit U), the plurality of detectors for reach lens together representing an input image multiplied by a selected transform matrix (column 6 line 18 – 24; inverse matrix method and column 3 lines 63 *et seq.* processing unit U), a number of image pixels in the image being greater than the plurality of detectors (column 2 lines 46 – 58).

However, Tanida et al. fails to teach that the pixels are sub-pixels. Mendlovic et al., on the other hand teaches that the pixels are sub-pixels.

More specifically, Mendlovic et al. teaches that that the pixels are sub-pixels (column 2 line 38 – 45, column 6 liens 47 *et seq.*, column 13 lines 3 *et seq.*, and column 14 lines 8 *et seq.*; sub-pixel).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Mendlovic et al. with the teachings of Tanida et al. because in column 2 line 27 – column 3 line26 Mendlovic et al. teaches that using the CCD configuration of the invention will improve the image quality.

However, Tanida et al. in view of Mendlovic et al. fail to teach that each image blocking portion being smaller than a detector. Heller et al., on the other hand teaches each image blocking portion being smaller than a detector.

More specifically, Heller et al. teaches that each image blocking portion being smaller than a detector (figures 2, 4, 7, 7A and 8).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Heller et al. with the teachings of Tanida et al. in view of Mendlovic et al. because in column 2 lines 29 - 35 Heller et al. teaches that the invention compensates for the effect of perspective viewing hence improving the image quality.

Regarding **claim 13**, as mentioned above in the discussion of claim 12, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches a birefringent structure plurality of filters ((column 2 lines 46 – 58; also [figure 8 item 4 polarizing filter array with plurality of polarizing filters 4a; also, column 6 lines 25 – 60] and/or [figure 15 item 7 diffraction grating; also column 10 lines 57 *et seq.*]).

Regarding **claim 15**, as mentioned above in the discussion of claim 12, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches at least one sensor pixel receives light from more than one lens of the array of lenses (figure 11, 12A, and 12B).

Regarding **claim 16**, as mentioned above in the discussion of claim 12, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches that the focal plane-

coding element is an apertured mask (figure 1, item 2 partition wall layer with partition layers 2a).

Regarding **claim 17**, as mentioned above in the discussion of claim 1, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches that the focal plane coding element is closer to the plurality of sensor pixels than to the array of lenses (figure 8 when the array 4 is places in figure 1).

Regarding **claim 18**, as mentioned above in the discussion of claim 12, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches that the focal plane coding element is between the plurality of sensor pixels than to the array of lenses (figure 8 when the array 4 is places in figure 1).

Regarding **claim 19**, as mentioned above in the discussion of claim 18, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches that the focal plane coding element is closer to the plurality of sensor pixels than to the array of lenses (figure 8 when the array 4 is places in figure 1).

Regarding **claim 21**, as mentioned above in the discussion of claim 1, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the

limitations of the parent claim. Additionally, Tanida et al. teaches that a majority of patterns of multiple pixel resolution elements are different from one another (figure 8, array 4).

However, Tanida et al. in view of Heller et al. fail to teach that the pixels are sub-pixels. Mendlovic et al., on the other hand teaches that the pixels are sub-pixels.

More specifically, Mendlovic et al. teaches that that the pixels are sub-pixels (column 2 line 38 – 45, column 6 liens 47 *et seq.*, column 13 lines 3 *et seq.*, and column 14 lines 8 *et seq.*; sub-pixel also figure 11).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Mendlovic et al. with the teachings of Tanida et al. in view of Heller et al. because in column 2 line 27 – column 3 line26 Mendlovic et al. teaches that using the CCD configuration of the invention will improve the image quality.

Regarding **claim 22**, as mentioned above in the discussion of claim 1, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches that a majority of patterns of multiple pixel resolution elements block substantially half of incident light (figure 8, array 4).

However, Tanida et al. in view of Heller et al. fail to teach that the pixels are sub-pixels. Mendlovic et al., on the other hand teaches that the pixels are sub-pixels.

More specifically, Mendlovic et al. teaches that that the pixels are sub-pixels (column 2 line 38 – 45, column 6 liens 47 *et seq.*, column 13 lines 3 *et seq.*, and column 14 lines 8 *et seq.*; sub-pixel).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Mendlovic et al. with the teachings of Tanida et al. because in column 2 line 27 – column 3 line26 Mendlovic et al. teaches that using the CCD configuration of the invention will improve the image quality.

Regarding **claim 23**, as mentioned above in the discussion of claim 1, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches that each pattern of multiple pixel resolution elements includes a plurality of apertures (figure 8, array 4).

However, Tanida et al. in view of Heller et al. fail to teach that the pixels are sub-pixels. Mendlovic et al., on the other hand teaches that the pixels are sub-pixels.

More specifically, Mendlovic et al. teaches that that the pixels are sub-pixels (column 2 line 38 – 45, column 6 liens 47 *et seq.*, column 13 lines 3 *et seq.*, and column 14 lines 8 *et seq.*; sub-pixel).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Mendlovic et al. with the teachings of Tanida et al. in view of Heller et al. because in column 2 line 27 – column 3

line26 Mendlovic et al. teaches that using the CCD configuration of the invention will improve the image quality.

Regarding **claim 24**, as mentioned above in the discussion of claim 1, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches that at least one pattern of multiple pixel resolution elements transmits substantially all incident light (figure 8 item 4, Tanida et al. teaches that some of the patterns will be transmitting all light through).

However, Tanida et al. in view of Heller et al. fail to teach that the pixels are sub-pixels. Mendlovic et al., on the other hand teaches that the pixels are sub-pixels.

More specifically, Mendlovic et al. teaches that that the pixels are sub-pixels (column 2 line 38 – 45, column 6 liens 47 *et seq.*, column 13 lines 3 *et seq.*, and column 14 lines 8 *et seq.*; sub-pixel).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Mendlovic et al. with the teachings of Tanida et al. in view of Heller et al. because in column 2 line 27 – column 3 line26 Mendlovic et al. teaches that using the CCD configuration of the invention will improve the image quality.

Regarding **claim 25**, as mentioned above in the discussion of claim 12, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the

limitations of the parent claim. Additionally, Tanida et al. teaches that a majority of patterns of multiple pixel resolution elements are different from one another (figure 8, array 4).

However, Tanida et al. in view of Heller et al. fail to teach that the pixels are sub-pixels. Mendlovic et al., on the other hand teaches that the pixels are sub-pixels.

More specifically, Mendlovic et al. teaches that that the pixels are sub-pixels (column 2 line 38 – 45, column 6 liens 47 *et seq.*, column 13 lines 3 *et seq.*, and column 14 lines 8 *et seq.*; sub-pixel).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Mendlovic et al. with the teachings of Tanida et al. in view of Heller et al. because in column 2 line 27 – column 3 line26 Mendlovic et al. teaches that using the CCD configuration of the invention will improve the image quality.

Regarding **claim 26**, as mentioned above in the discussion of claim 12, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches that a majority of patterns of multiple pixel resolution elements block substantially half of incident light (figure 8, array 4).

However, Tanida et al. in view of Heller et al. fail to teach that the pixels are sub-pixels. Mendlovic et al., on the other hand teaches that the pixels are sub-pixels.

More specifically, Mendlovic et al. teaches that that the pixels are sub-pixels (column 2 line 38 – 45, column 6 liens 47 *et seq.*, column 13 lines 3 *et seq.*, and column 14 lines 8 *et seq.*; sub-pixel).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Mendlovic et al. with the teachings of Tanida et al. in view of Heller et al. because in column 2 line 27 – column 3 line26 Mendlovic et al. teaches that using the CCD configuration of the invention will improve the image quality.

Regarding **claim 27**, as mentioned above in the discussion of claim 12, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches that each pattern of multiple pixel resolution elements includes a plurality of apertures (figure 8, array 4).

However, Tanida et al. in view of Heller et al. fail to teach that the pixels are sub-pixels. Mendlovic et al., on the other hand teaches that the pixels are sub-pixels.

More specifically, Mendlovic et al. teaches that that the pixels are sub-pixels (column 2 line 38 – 45, column 6 liens 47 *et seq.*, column 13 lines 3 *et seq.*, and column 14 lines 8 *et seq.*; sub-pixel).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Mendlovic et al. with the teachings of Tanida et al. in view of Heller et al. because in column 2 line 27 – column 3

line26 Mendlovic et al. teaches that using the CCD configuration of the invention will improve the image quality.

Regarding **claim 28**, as mentioned above in the discussion of claim 12, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches that at least one pattern of multiple pixel resolution elements transmits substantially all incident light (figure 8 item 4, Tanida et al. teaches that some of the patterns will be transmitting all light through).

However, Tanida et al. in view of Heller et al. fail to teach that the pixels are sub-pixels. Mendlovic et al., on the other hand teaches that the pixels are sub-pixels.

More specifically, Mendlovic et al. teaches that that the pixels are sub-pixels (column 2 line 38 – 45, column 6 liens 47 *et seq.*, column 13 lines 3 *et seq.*, and column 14 lines 8 *et seq.*; sub-pixel).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Mendlovic et al. with the teachings of Tanida et al. in view of Heller et al. because in column 2 line 27 – column 3 line26 Mendlovic et al. teaches that using the CCD configuration of the invention will improve the image quality.

Regarding **claim 29**, as mentioned above in the discussion of claim 12, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the

limitations of the parent claim. Additionally, Tanida et al. teaches wherein color filters serve as pixel resolution elements (column 11 lines 24 – 38).

However, Tanida et al. in view of Heller et al. fail to teach that the pixels are sub-pixels. Mendlovic et al., on the other hand teaches that the pixels are sub-pixels.

More specifically, Mendlovic et al. teaches that that the pixels are sub-pixels (column 2 line 38 – 45, column 6 liens 47 *et seq.*, column 13 lines 3 *et seq.*, and column 14 lines 8 *et seq.*; sub-pixel).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Mendlovic et al. with the teachings of Tanida et al. in view of Heller et al. because in column 2 line 27 – column 3 line26 Mendlovic et al. teaches that using the CCD configuration of the invention will improve the image quality.

Regarding **claim 36**, as mentioned above in the discussion of claim 1, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches that each image blocking portion is smaller than a detector in both directions (figure 8 item 4 polarizing filter array with plurality of polarizing filters 4a; also column 6 lines 25 – 60; the plurality of filters 4a can be broken down as each filter 4a including a plurality of polarizing beam splitters).

Regarding **claim 37**, as mentioned above in the discussion of claim 36, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches that each image blocking portion in a pattern has equal dimensions in both directions (figure 8 item 4 polarizing filter array with plurality of polarizing filters 4a; also column 6 lines 25 – 60; the plurality of filters 4a can be broken down as each filter 4a including a plurality of polarizing beam splitters).

Regarding **claim 39**, as mentioned above in the discussion of claim 12, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches that each image blocking portion is smaller than a detector in both directions (figure 8 item 4 polarizing filter array with plurality of polarizing filters 4a; also column 6 lines 25 – 60; the plurality of filters 4a can be broken down as each filter 4a including a plurality of polarizing beam splitters).

Regarding **claim 40**, as mentioned above in the discussion of claim 39, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches that each image blocking portion in a pattern has equal dimensions in both directions (figure 8 item 4 polarizing filter array with plurality of polarizing filters 4a; also column 6 lines 25 – 60;

the plurality of filters 4a can be broken down as each filter 4a including a plurality of polarizing beam splitters).

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tanida et al. (US patent No. 7,009,652) in view of Mendlovic et al. (US patent No. 7,003,177) in view of Heller et al. (US patent No. 5,355,222) and further in view of Bills (US patent No. 6,366,319).

Regarding **claim 5,** as mentioned above in the discussion of claim 1 Tanida et al. in view of Mendlovic et al. in view of Heller et al. teach all of the limitations of the parent claim.

However, Tanida et al. in view of Mendlovic et al. fail to teach that the color filters are integral with the focal plane-coding element. Bills, on the other hand teaches that the color filter is adjoined to another element in the focal plane.

More specifically, Bills teaches that the color filter is adjoined to a focal plane array (FPA) located in the focal plane (Figures 1, 2A, 6, and 7; items 105 and 107; Also, Abstract; Also, column 2 lines 29 - 37).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Bills with the teachings of Tanida et al. in view of Mendlovic et al. in view of Heller et al. because in column 2 lines 29 – 37 Bills teaches that this mosaics attempt to match the wavelength-dependent sensitivity of the human eye by including a larger percentage of green pixels than red and blue pixels which in turn will produce a more natural image. Also the combination

of the color filter is adjoined to a focal plane array will produce a simpler device which will reduce size by not requiring the two components at two different sections of the camera.

Claims 7 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanida et al. (US patent No. 7,009,652) in view of Mendlovic et al. (US patent No. 7,003,177) in view of Heller et al. (US patent No. 5,355,222) and further in view of Meyers (US patent No. 6,137,535).

Regarding **claim 7,** as mentioned above in the discussion of claim 1 Tanida et al. in view of Mendlovic et al. in view of Heller et al. teach all of the limitations of the parent claim.

However, Tanida et al. in view of Mendlovic et al. fail to teach a corresponding plurality of focusing lenses, a focusing lens between the focal plane encoding element and a corresponding sensor pixel. Meyers, on the other hand teaches a corresponding plurality of focusing lenses, a focusing lens between the focal plane encoding element and a corresponding sensor pixel.

More specifically, Meyers teaches a corresponding plurality of focusing lenses, a focusing lens between the focal plane encoding element and a corresponding sensor pixel (figure 2; items 72, 10, and 24).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Meyers with the teachings of Tanida et al. in view of Mendlovic et al. in view of Heller et al. because in column 3 lines

46 - 55 Meyers teaches that by use of the invention an extremely compact digital camera with a lenslet array in close proximity to a photodetector array is formed. Due to the larger sub-image size a reduced number of lenslets are needed to construct the full image. By utilizing the space between sub-groups of photodetectors for signal processing electronics, the digital camera can be formed on a single substrate. In addition, a large high-resolution sensor can be synthesized by the use of sub-groups of photodetectors.

Regarding **claim 14,** as mentioned above in the discussion of claim 12 Tanida et al. in view of Mendlovic et al. in view of Heller et al. teach all of the limitations of the parent claim.

However, Tanida et al. in view of Mendlovic et al. in view of Heller et al. fail to teach a corresponding plurality of focusing lenses, a focusing lens between the filter and a corresponding sensor pixel. Meyers, on the other hand teaches a corresponding plurality of focusing lenses, a focusing lens between the filter and a corresponding sensor pixel.

More specifically, Meyers teaches a corresponding plurality of focusing lenses, a focusing lens between the focal plane encoding element and a corresponding sensor pixel (figure 2; items 72, 10, and 24).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Meyers with the teachings of Tanida et al. in view of Mendlovic et al. in view of Heller et al. because in column 3 lines

46 - 55 Meyers teaches that by use of the invention an extremely compact digital camera with a lenslet array in close proximity to a photodetector array is formed. Due to the larger sub-image size a reduced number of lenslets are needed to construct the full image. By utilizing the space between sub-groups of photodetectors for signal processing electronics, the digital camera can be formed on a single substrate. In addition, a large high-resolution sensor can be synthesized by the use of sub-groups of photodetectors.

Claims 8, 20, 35, and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanida et al. (US patent No. 7,009,652) in view of Mendlovic et al. (US patent No. 7,003,177) in view of Heller et al. (US patent No. 5,355,222) and further in view of Official Notice.

Regarding **8 and 20**, as mentioned above in the discussion of claim 1 and 12 respectively, Tanida et al. in view of Mendlovic et al. in view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches that the columns and rows can be varied (column 7 lines 24 – 40)

However, Tanida et al. in view of Mendlovic et al. in view of Heller et al. fail to teach that the selected transform matrix has fewer rows than columns.

The examiner takes Official Notice that it is old and well known in the art to use matrices of different sizes.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a matrix with fewer rows then columns to have a wide angle image.

Regarding claims **35, and 38**, as mentioned above in the discussion of claims 1 and 12 respectively, Tanida et al. in view of Mendlovic et al. in view of Heller et al. teach all of the limitations of the parent claim.

However, Tanida et al. in view of Mendlovic et al. in view of Heller et al. fail to teach that the selected transform matrix is a Hadamard matrix.

The examiner takes Official Notice that it is old and well known in the art to use Hadamard matrix when capturing an image.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a Hadamard matrix to correct for errors and the very same matrix which is used for deriving the transformed components of the input video signal can be used for reconverting such transformed components back into the original video signal.

(10) Response to Argument

Arguments: The applicant argues that the references of Tanida et al. and Heller et al. are not properly combinable The Tanida et al. reference is directed to an imaging apparatus, while the Heller et al. reference is directed to an optical position detecting device, i.e., the Heller et al. reference does not image anything, but merely detects presence or absence of light output from an optical transmitter attached to a moving object. The reasons for combining provided in the Office action regarding detection set forth in the Heller et al. reference would not apply to the imaging system as in the Tanida et al. reference. One of skill in the art would not be motivated to combine

teachings regarding such optical position detecting devices with imaging systems. While the Heller et al. reference may be directed to analyzing light, the Heller et al. reference is not directed to imaging light. Improving the resolution of detection of a moving target in the Heller et al. reference is not reasonably pertinent to the particular problem of creating a compact, high resolution imager in the Tanida et al. reference.

The microlenses in the Tanida et al. reference exacerbate the problems noted in the Heller et al. reference, as microlenses are more complex and sensitive to alignment issues than individual lenses. The apertures in the Heller reference are in the aperture plane so that the field of view is limited for the corresponding sensor, i.e., each aperture corresponds to a single sensor in the Heller et al. reference. A pattern of these apertures would not be "substantially the same for the plurality of detectors associated with a corresponding lens" as recited in claim 30. Even if the apertures of the Heller et al. reference were used with the lenses in the Tanida et al. reference, there is no suggestion or teaching in the combination as to where to place the apertures relative to the lenses. In particular, as the aperture plane in the Tanida et al. reference is the lens plane13, at most, one aperture would be placed on each lens, i.e., not between the lenses and the detectors, as recited in claim 30.14 Such an arrangement would result in the aperture and, thus, the lens, being associated either with a single sensor or the aperture and, thus, the lens, being associated with the plurality of detectors, which would not provide sub-pixel resolution. There is no suggestion or teaching in the combination that a pattern of these apertures would be "substantially the same for the plurality of detectors associated with a corresponding lens" as recited in claim 30.

Response: First, The examiner notes that the art of Tanida et al. and Heller et al. are within the field of endeavor as the present application. In response to Applicant's argument that Tanida et al. and Heller et al. are non-analogous art, it has been held that the determination that a reference is from a non-analogous art is twofold. First, we decide if the reference is within the field of the inventor's endeavor. If it is not, we proceed to determine whether the reference is reasonably pertinent to the particular problem with which the inventor was involved. In re Wood, 202 USPQ 171, 174. In this case, Tanida et al. clearly teaches in column 2 lines 46 - 58 that image pickup is performed. Heller et al. also includes photo-sensors used to detect light as discussed in column 3 lines 38 - 45. Hence both Tanida et al. and Heller et al. are both within the

field of endeavor as the present application since both of the inventions have detectors for detecting light for processing.

Appellant cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references (Tanida et al. and Heller et al. (Or) See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Second, the concept of using an imaging system using detectors and array of lenses including blocking portions and a transform matrix is clearly taught throughout the disclosure of the primary reference of Tanida et al. For example, column 3, line 52 – column 4 line 9 of Tanida et al clearly states:

> "In FIG. 1, reference numeral 1 represents a microlens array having microlenses 1a arranged in a two-dimensional array, in a square shape for example, and reference numeral 3 represents a photosensitive element array disposed below the microlens array 1 so as to face it and having photosensitive elements 3a arranged similarly in a two-dimensional array, in a square shape for example. Reference numeral 2 represents a partition wall layer disposed between microlens array 1 and photosensitive element array 3 and composed of partition walls 2a that are arranged below the boundaries of the individual microlenses 1a of the microlens array 1 so as to form a grid-like structure. As shown in FIG. 1, one microlens 1a of the microlens array 1 corresponds to a plurality of photosensitive elements 3a of the photosensitive element array 3, and

corresponds to one compartment formed in between in the partition wall layer 2. As an imaginary square prism drawn with broken lines indicates, these together form a signal processing unit U. The individual units are separated from one another by the partition walls 2a to prevent the optical signal from one microlens 1a from entering the adjacent units; that is, the optical path through each unit is restricted. As the photosensitive element array 3, it is possible to use a solid-state image-sensing device such as a CCD. This helps reduce the number of components needed and thereby simplify the construction of the image input apparatus"; and

Also figure 8 and column 6 lines 18 – 24 teach the remaining limitations of the claim.

Examiner only uses the secondary reference of Heller et al. to support examiner's position of blocking portion being smaller than a detector which is clearly shown in figures 2, 4, 7, 7A, and 8.

Hence the examiner kindly notes that the applicant only argues each cited reference individually whereas the rejection is a combination of the references, and as discussed above, each limitation is taught via the combination of the cited references as a whole. It has been held that the test for obviousness is not whether the features of one reference may be bodily incorporated into the other to produce the claimed subject

matter but simply what the combination of references makes obvious to one of ordinary skill in the art in the pertinent art. In re Bozek, 163 USPQ 545 (CCPA 1969).

In response to Applicant's argument that there is no suggestion to combine the references, the Examiner recognizes that references cannot be arbitrarily combined and that there must be some reason why one skilled in the art would be motivated to make the proposed combination of primary and secondary references. In re Nomiya, 184 USPQ 607 (CCPA 1975). However, there is no requirement that a motivation to make the modification be expressly articulated. The test for combining references is what the combination of disclosures taken as a whole would suggest to one of ordinary skill in the art. In re McLaughlin, 170 USPQ 209 (CCPA 1971) references are evaluated by what they suggest to one versed in the art, rather than by their specific disclosures. In re Bozek, 163 USPQ 545 (CCPA 1969). In this case, Heller et al. clearly in column 2 lines 29 - 35 Heller et al. teaches that the invention compensates for the effect of perspective viewing hence improving the image quality. Also in column 2 lines 3 – 5 Heller et al. clearly teaches that using the invention an optical location system that minimizes the number and size of sensors required for a desired resolution, and also minimizes accuracy of position finding is formed.

Second, As mentioned above the examiner only uses the secondary reference of Heller et al. to support examiner's position of blocking portion being smaller than a detector which is clearly shown in figures 2, 4, 7, 7A, and 8. Hence even though the

applicant argues that Heller et al. mentions briefly in the background of the invention that lenses can be replaced by apertures. There is no language in Heller et al. of prohibiting the use of lenses and apertures together. Even if there was the examiner only uses the reference of Heller et al. to teach the idea of blocking portion being smaller than a detector are present in the prior art.

Third, the examiner notes that one of ordinary skill in the art at the time the invention was made would have been motivated would consider placing the blocking portion being smaller than a detector of Heller et al. in the blocking portion as shown in figure 8 of Tanida et al. to conform with the structure of Tanida et al.

Forth, the examiner notes that Tanida et al. figure 8 teaches that a pattern of multiple image blocking portions being substantially the same for the plurality of detectors associated with a corresponding lens. Next the examiner notes that Heller et al. teaches that for example figures 7 and 7A items A(0) and A(2) or figures 4 and 8 items A(1) and A(4), A(2) and A(5) are the same. Also, it would have been obvious to one having ordinary skill in the art at the time the invention was made to make a pattern of multiple image blocking portions being substantially, since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. St. Regis Paper Co. v. Bemis Co., 193 USPQ 8.

Fifth, As mentioned above the examiner notes that one of ordinary skill in the art at the time the invention was made would have been motivated would consider placing the blocking portion being smaller than a detector of Heller et al. in the blocking portion as shown in figure 8 of Tanida et al. to conform with the structure of Tanida et al.

Sixth, The examiner uses the reference of Mendlovic et al. to teach that that the pixels are sub-pixels (column 2 line 38 – 45, column 6 liens 47 *et seq.*, column 13 lines 3 *et seq.*, and column 14 lines 8 *et seq.*; sub-pixel).

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Usman Khan/

Primary Examiner, Art Unit 2622

Conferees:

/Jason Chan/

Supervisory Patent Examiner, Art Unit 2622

/LIN YE/

Supervisory Patent Examiner, Art Unit 2622